KOMPANEYETS, A.

Our own business. NTO 2 no.5:56-57 My '60. (MIRA 14:5)

1. Predsedatel' pravleniya nauchno-tekhnicheskogo obshchestva Yugo-Zapadnoy zheleznoy dorogi, g.Kiyev.
(Railroads—Technological innovations)

KOMPANEYETS, A.A.

Adoption of advanced welding techniques by the Southwestern Railroads. Zhel.dor.transp. 42 no.12:58-63 D '60. (MIRA 13:12)
(Ukraine--Railroads--Equipment and supplies) (Welding)

KOMPANEYETS, A. I.

Physicists

Idealism of physics in service of imperialism., Fiz. v shkole, no. 1, 1952.

9. Monthly List of Russian Accessions, Library of Congress, March 1952. Unclassified.

USSR/Physics - Electrodynamics of Dirac 21 Feb 52

"Concerning the New Formulation of Electrodynamics by Dirac," A. Kompaneyets

"Dok Ak Nauk SSSR" Vol LXXXII, No 6, pp 873-875

Discusses the new formulation of classical electrodynamics proposed by Dirac (P. A. M. Dirac, Proc Roy Soc 209, 291, 1951. Considers the soln of the Dirac Eqs for a charged sphere: $dP_i^h/dx^h = 4\pi LA_i$, $A_iA^t = -m^2c^4/e^2$. Shows that these eqs possess 2 solns: one soln in which the charges disperse, and the other soln in which the

214T82

charges converge to the center (both in the case where the initially at-rest pos charge of a sphere is uniformly distributed in space). Submitted by Acad N. N. Semenov, 20 Dec 51.

(PA 56 no. 668: 5450 '53)

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KOMPANEYETS, A. [1·]

KOMPANEYETS, A.I. (Moscow)

N.A.Umov, the originator of the energy motion equation. Fiz. v shkole 14 no.4:20-25 Jl-Ag '54. (MLRA 7:7)
(Force and energy) (Umov, Nikolai Alekseevich, 1846-1915)

KOMPANEYETS, A.I.; NOZDREV, V.F., doktor fiziko-matematicheskikh nauk, redaktor.

[The struggle of N.A.Umov for materialism in physics] Bor'ba N.A.Umova za materializm v fizike. Mosvka, Izd-vo Akademii nauk SSSR, 1954. 126 p. (MLRA 7:8)
(Umov, Nikolai Alekseevich, 1846-1915)

KOMPANEYETS, A.I. (Moskva)

The concept of force in physics. Fiz. v shkole 15 no.6:16-21
N-D '55. (Force and energy) (MLRA 9:2)

KOMPANEYETS, Aleksey Ivanovich; BASKAKOV, V.G., otvetstvennyy redaktor; ROZENBERG, R.Yu., redaktor izdatel'stva; MAKUNI, Ye.V., tekhnicheskiy redaktor

[A.G.Stoletov's philosophy] Mirovozzrenie A.G.Staletova. Moskva, Izd-vo Akademii nauk SSSR, 1956. 286 p. (MLRA 10:1)
(Stoletov, Aleksandr Grigor'evich, 1839-1896)

L 2263-66 EWT(1)/FCC GW
ACCESSION NR: AP5010228 UR/0362/65/001/003/0335/0338
16
B

AUTHOR: Kompaniyets, A. I.
44,55

TITLE: Aerosol indicatrices of scattering of light in the free atmosphere at heights of 10 km

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 3, 1965, 335-338

12,44,55

TOPIC TAGS: scattered sky light, Rayleigh scattering, aerosol, airplane sounding, almucantar, zenith, azimuth, indicatrix, sky brightness

ABSTRACT: Scattered sky light consists of light scattered by first-order Rayleigh scattering, the remainder of Rayleigh scattering formed by multiply scattered light in the lower atmosphere and at the ground level, and the light scattered on aerosols. Investigations of the light scattering have been carried out by means of airplane sounding above Moscow, using an antimony-cesium cathode as the receiver. Measurements have been made at a height of 10 km on almucantars of 45° and 60° of zenithal distances at various azimuths from the solar vertical. Measurements were repeated on the ground in the same order. Graphs of indicatrices for various heights are

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ACCESSION NR: AP5010228

presented as results of processed observation data. The aerosol component of the scattered light which depends upon the state of aerosols in the atmosphere plays an important role in the brightness of cloudless skies. Orig. art. has: 3 figures, 2 tables, and 3 formulas. [EG]

ASSOCIATION: none

SUBMITTED: 16Aug63 ENCL: 00 SUB CODE: AA, NP

NO REF SOV: 008 OTHER: 000 ATD PRESS: 3251

dag

Card 2/2

KOMPANEYETS, A., doktor fiz.-matem.nauk

Ferromagnetism and antiferromagnetism. Radio no.4:35-39 Ap '63. (MIRA 16:3)

(Ferromagnetism)

KOMPANEYETS, A. S. and LANDAU, L.

"The Electrical Conductivity of Metals," Gosudarst. Nauch.Tekh. Izdatel., Khar'kov, 1935, 60 pp.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

BC

A-1

β-Disintegration induced by a central collision of an electron with a heavy particle. A. Kompaneez (Physikal. Z. Sowjetunion, 1937, 12, 138—147).—Theoretical. The probability that a fast electron colliding centrally with a heavy particle (proton or neutron) will bring about a β-disintegration is calc. A. J. M.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KOMPANEYETS, A. S.

"Absorption of Sound by Crystals at High Temperatures," Dokl. AN SSSR, 14, No.5, pp 267-270, 1937

Inst. Phys. Tech., Dnepropetrovsk

KOMPANEYETS, A. S.

"Induced Beta Disintegration of Heavy Particles with Simultaneous Appearance of Quanta," Zhur. Eksper. i Teoret. Fiz., Vol. 8, page 1077, 1938

The effective cross-section of the B-decay of heavy particles induced by very hard gamma-rays with simultaneous radiation of another hard quantum is given by approximately 10-40 sq. cm. for cosmic rays.

Dnepropetrovsk State U.

KOMPANEYETS, A. S.

"Residual Stresses in Quenched Cylindrical Specimens," Zhur. Tekh. Fiz., 9, No.4, pp. 287-294, 1939

Dnepropetrovsk Phys.Tech. Inst.

KOMPANEYETS, A. S.

"On the Viscosity of the Electron Liquid in Metals," Zhur. Eksper. i Teoret. Fiz., 9, No.8, pp. 920-926, 1939

Ukr. Phys.Tech. Inst., Khar'kov

KOMPANEYETS, Dr. A. S.

"Recoil Electron Spectrum of Gamma-Rays from RaC," Journal Phys., Vol. 3, Nos. 4-5, 1940. 251 (Physico-Tech. Inst., Acad. of Sciences of the Ukrainian SSR, Karkov)

A method of analysing energies of recoil electrons is developed; it consists essentially of a magnetic spectrograph with two Geiger-Muller counters for recording the electrons by the coincidence method. The method is applied to the examination of the recoil-electron spectrum of Ra-C. The energy spectrum shows a no. of peaks. Comparison with the internal conversion positron spectrum indicates that the relative intensities of the γ-lines of Ra-C obtained from the positron spectrum and the recoil-electron spectrum are the same. The theoretical curve calc. from Jaeger and Hulme's theory which gives the dependence of the internal conversion coeff. on the γ-ray energy for quadripole transitions is verified. The principal hard γ-lines of the Ra-c spectrum are of quadripole origin.

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

Ca

3

Spectrum of recoil atoms from radium C γ rays G. D. Latyshev, A. S. Kompaneets, N. P. Bartsov and I. M Gusak. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 10, 986 1001(1940). The recoil atoms are analyzed by means of a magnetic spectrograph. The energies, relative intensities and multipolarities (usually quadrupolar) of 12 γ-lines with e. kv. from 1100 to 1420 were detd. These data satisfy the theoretical curve obtained by Jaeger and Hulme (*Proc. Roy. Soc.* (London) **148A**, 708(1935); C. A. 29, 3225) for inner conversion of γ-rays. F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KOMPANEYETS, A.S.

CA

3

Vibrational overtones of polyatomic molecules. A. Kompaneets. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 10, 1175-7(1940).—Theoretical-math. The conditions under which mol. symmetry groups yield wave functions are considered. F. H. Rathmann

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

KOMPANEYETS, A. (S.)

"On the Absorption of Light by Plasma," Zhur. Eksper. i Teoret. Fiz., Vol. 14, No. 6, 1944. (Central Asian State Univ., Tashkent -1943-) pp. 171-176

It is known that free electrons do not absorb light. It would therefore appear that a completely ionized gas at a sufficiently high temperature would have a very low absorption coefficient. To verify this, a mathematical investigation of the propagation of electromagnetic oscillations in a plasma is presented. It is shown that owing to the forces acting between the electrons and the positive ions of the plasma the latter possesses a considerable absorption co-efficient. This absorption, as distinct from the phtoelectric absorption, does not decrease with the frequency of the light wave and the temperature of the plasma. A formula (37) is derived determining the absorption coefficient, and methods are indicated for carrying out the necessary calculations. .

KOMPANEVETS, A.S.

CA

3

Multiple scattering of fast electrons and α-particles in heavy elements. A. Kompaneets (Phys. Tech. Inst., Acad. Sci. U.S.S.R.). *J. Phys.* (U.S.S.R.) 9, No. 1, 17-24(1945).—Math. An expression is given for angular distribution functions within a thin plate. The half-width is 20 to 30% smaller than by Williams' and Goudsmit and Saunderson's formulas. S. L. Gerhard

Also in ZHUR. EKSPER. i Teoret. Fiz. 15, No. 6, 1945

" " ~~ZHUR. Fiz. i~~

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

C. A. KOMPANEYETS, A. S.

3a.

1951

No. 12

Multiple scattering of thin beans of fast electrons. A Kompaneets (Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Eksptl. Teoret. Fiz.* 17, 1050-62(1947).—Different half-widths of the angular distribution should be obtained depending on whether the measurements are made with a long or with a short counter. In the 1st instance, the counter will register all electrons deviating by a certain angle from a plane, and the distribution obtained is one over plane angles. In the 2nd instance, the counter will register all electrons contained within a certain solid angle. Neither distribution is gaussian, but numerically they are close to it. N. Thon

KOMPANEYETS, Dr. A. S.

"Residual Stresses in Quenched Test Pieces of Cylindrical Shape," Zhur. Tekh. Fiz., Vol. 9, 1949.

KOMPANEYETS, A. S., VOYEVODSKIY, V. V.

Nuclear Fission

Chain reactions in computing diffusion of two active centers. Zhur. eksp. i teor. fiz. 23 No. 2, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952, UNCLASSIFIED.

KAMPANEYETS A.S.

[illegible] Dirac's [illegible]

[illegible] new classical [illegible]

[illegible] must be excluded as [illegible]

KOMPANEYETS, A. [S.]

Application of the self-adjusting field method to the nucleus. Dokl. Akad. Nauk SSSR 85, No.2, 301-4 '52. (MLRA 5:8)
(PA 56 no.671:7830 '53)

Shows that subject method, first applied by C. F. Weizsacker in 1935, in general can explain certain basic laws governing the structure of the nuclei, namely, the approximate constancy of energy and size in one nucleon, which will permit one at least to obtain approximate numerical values for some presently inknown constants relating to nuclear forces. Acknowledges helpful discussions of Ya. B. Zel'dovich and V. L. Ginzburg. Presented by Acad. N. N. Semenov 14 May 52. 252T84

KOMPANEYETS, A.S.

VOYEVODSKIY, V.V.; KOMPANEYETS, A.S.

On N.S. Akulov's article; "Theory of chain reaction in the calculation of diffusion of active centers." Zhur.eksp.i teor. fiz. 25 no.3:379-380 S '53. (MLRA 7:10)
(Chemical reactions) (Akulov, N.S.)

PANEYETS, A.S.

USSR

assuming the 2-particle interaction to contain. In

ZEL'DOVICH, Yakov Borisovich; KOMPANEYETS, Aleksandr Solomonovich; SHUTOV, S.N., redaktor; AKHLAMOV, S.N., tekhnicheskiy redaktor.

[Theory of detonation] Teoriia detonatsii. Moskva, Gos.izd-vo tekhniko-teoret.lit-ry, 1955. 268 p. (MLRA 8:9)
(Explosions)

KOMPANEYETS, Aleksandr Solomonovich; GRIGOROVA, V.A., redaktor; GAVRILOV, S.S., tekhnicheskiy redaktor

[Theoretical physics] Teoreticheskaia fizika. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1955. 532 p. (MLRA 8:8)
(Physics)

KOMPANEYETS A. S.

USSR/Physics - Resonators FD-3119

Card 1/1 Pub. 153 - 18/24

Author : Kompaneyets, A. S.; Sayasov, Yu. S.

Title : Theory of electromagnetic resonators that are close in shape to conical

Periodical : Zhur. tekh. fiz., 25, No 6 (June), 1955, 1124-1131

Abstract : The authors investigate the oscillations of electrical type in an electro-magnetic resonator formed from a spheroid and from a two-branch hyperbola cofocal with the spheroid in case of small ratios of focal distance to wave length. He modifies the ordinary method of the theory of perturbations so that consideration is taken of the strong deviation of the field in the resonator of the studied type from the field in the conical resonator close to the apices of cones. That is, the authors' aim is the strict investigation of the so-called spheroidal resonator under the assumption that the gap (the interval between the vertices of the hyperboloids) is sufficiently small. Five references, including one USSR: L. M. Ryzhik and I. S. Gradshteyn, Tablitsy integralov, GTTI, 1951.

Institution :

Submitted : April 3, 1954

KoMPaneyets, A. S.

USSR/Physics - Scattering FD-1846

Card 1/1 Pub. 146 - /25

Author : Kompaneyets, A. S.

Title : Multiple scattering in a Coulomb field in very thin layers of a substance

Periodical : Zhur. eksp. i teor. fiz. 28, 308-311, March 1955

Abstract : The author presents data on multiple Coulomb scattering in layers of a substance with optical thickness equal to 1 and 3. He explains the relative role of unit and multiple scattering for various angles of flight. In the supplement he discusses an optical model of Coulomb scattering in small angles. Five references, including: A. S. Kompaneyets, ibid, 15, 236, 1945; 17, 1059, 1947.

Institution: Moscow Engineering Physics Institute

Submitted : March 17, 1954

KOMPANEETS, A. S.
KOMPANEETZ, A.C., SEMENOV, N.N., ZEIMANOV, I.L., STEPANOV, B.M., SHEFFEL, B.K
(U.S.S.R.)

Some consideration on the operation °
of high current linear accelerators

CERN-Symposium on High Energy Accelerators and
Pion Physics

Geneva 11-23 June 56
In Branch #5

KOMPANEYETS, A.S.

Category : USSR / Radio Physics, Radiation of Radio Waves, Transmission Lines and Antennas I-5

Abs Jour : Ref Zhur - Fizika No 3, 1957, No 7296

Author : Kompaneyets, A.S., Sayasov, Yu. S.

Title : Effect of Small Irregularities in the Shape of A Volume on the Natural Electromagnetic Oscillations in Closed Volumes

Orig Pub : Tr. 3-go Vses. matem. S"yezda, 2-M, AN SSSR, 1956, 161-162

Abstract : Brief description of previously published works (See Referat Zhurnal Fizika, 1954, 945; 1955, 3259; 1956, 8112, 8131).

Card : 1/1 - 30 -

KOMPANEYETS, A. S.

USSR/Nuclear Physics - Instruments and Installations. Methods of Measurement and Investigation C-2

Abst Journal : Referat Zhur - Fizika, No 12, 1956, 33827

Author : Kompaneyets, A. S.

Institution : Kobe University, Kobe, Japan

Title : Buncher Theory

Original Periodical : Zhur. Tekhn. Fiziki, 1956, 26, No 3, 678-682

Abstract : Examination of the operation of a device for converting a continuous beam of charged particles into an aggregate of consecutive clusters. It is assumed that a narrow slit, in which a high-frequency longitudinal electric field is acting, is used as such a buncher. Theoretical calculations are carried out to clarify the effect of the large space charge on the operation of the buncher. It is shown that in that case when the buncher is used as the input section of a linear resonant accelerator, the effect of the space charge manifests itself favorably on the capture of the particles in the acceleration phase, so that it leads to a reduction in the spatial dispersion of the particle velocities.

Card 1/1

KOMPANEYETS, A-S.

CARD 1 / 2 PA 1650

SUBJECT USSR / PHYSICS

AUTHOR KOMPANEEC, A.S., PAVLOVSKIJ, E.S.

TITLE The Equations of the Self-Consisting Field in an Atom.

PERIODICAL Žurn.eksp.i teor.fis, 31, fasc.3, 427 - 438 (1956)
Issued: 12 / 1956

By means of FOCK's method of the self-consisting field the THOMAS - FERMI equations for the potential in an atom with all corrections of the order $Z^{-2/3}$ are here obtained. Z denotes the nuclear charge number of the element.

The equations for the density matrix: The energy integral is before variation reduced to the form $H = \Sigma\, U(q_i) + (1/2)\, V(q_i, q_k)$. This HAMILTONIAN contains only terms which belong to individual electrons and to their pair-wise interactions, and V is symmetric with respect to the variables. U denotes the sum of the kinetic and potential energy of the electron in the field of the nucleus and V - the energy of the electrostatic interaction of electrons. By variation and some transformations the following system for the required wave function Ψ_i is obtained: $U(q)\Psi_i(q) + B(q)\Psi_i(q) - \Sigma_k B_{ik}(q) \Psi_k(q) + \Sigma_k a_{ik} \Psi_k(q) = 0$

This equation is then transformed several times.

There follows transition to quasi-classical approximation: Here the matrix elements $\varrho(x,x')$ and $H(x,x')$ are developed in a series of Fourier integrals according to the difference of the arguments $x - x'$. Attention is in this case restricted to the third term of the separation which is explicitly written down. After putting the FOURRIER coefficient zero and integrating with respect to parts, we obtain a tensorial equation for H. Here two terms represent the classical POISSON parenthesis of the FOURRIER

...ical Physics of the Academy of Sciences of the USSR

KOMPANEYETS, A-S.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1969
AUTHOR KOMPANEEC, A.S.
TITLE On the Development of Thermal Equilibrium between Quanta and Electrons.
PERIODICAL Žurn.eksp.i teor.fis,31,fasc.5, 876-885 (1956)
Issued: 1 / 1957

The present paper investigates the influence exercised by the COMPTON effect on the thermal equilibrium between quanta and electrons in nonrelativistic approximation.
At first the kinetic equation for the distribution function n of the quanta in an unlimited medium is written down on which occasion only scattering is taken into account. This equation has the following form:
$(\partial n/\partial t)_c = -\int d\tau \int \left[n(1+n')N(\mathcal{E})-n'(1+n)N(\mathcal{E} + h\omega - h\omega')\right] dW$. Here N denotes the distribution function of the free electrons, $d\tau$ - the element of the phase volume of the electrons, dW - the differential probability of transition from the given state into another, which agrees with the laws of conservation for energy and momentum. The index C at $\partial n/\partial t$ indicates that only the COMPTON processes are taken into account in the equation. The statistical equilibrium between the electrons in the plasma occurs very rapidly independent of radiation and therefore the distribution function $N(\mathcal{E})$ must be considered to be MAXWELL-like. The energy of the electrons is here considered to be nonrelativistic, i.e. it holds that $kT \ll mc^2$. Then the energy transferred on the occasion of

Žurn.eksp.i teor.fis,31,fasc.5,876-885 (1956) CARD 2 / 2 PA - 1969

each individual act is low as compared with the energy of the quantum:
$\omega^1 - \omega = \Delta \ll \omega$. In consideration of this inequation the integral expression of the above equation is developed into a number of powers from Δ up to and including the second power. Next, the laws of conservation for momentum and energy are written down in nonrelativistic approximation. The kinetic equation is then several times transformed and linearized.
The slowing down spectrum: The spectrum of bremsstrahlung is, on the whole, of a complicated character. Here such conditions are presupposed as make it possible to make use of BORN'S approximation for the purpose of determining the spectrum. These conditions are satisfied in the case of light elements at sufficiently high temperatures. Besides, $kT \ll mc^2$ shall hold good. The scattering of electrons by electrons is here not taken into consideration. The slowing down cross section holding good in this case is written down. The relaxation time of thermal equilibrium in the case of a pure slowing down mechanism is $\tau_B = \tau_B^0/(e^{h\omega/kT}-1)$.
Next, the total kinetic equation is written down which takes COMPTON processes and slowing down processes into account. Next, the convection of energy from the electrons to the quanta by pure slowing down- and by pure COMPTON mechanisms is discussed. In conclusion the general formulae for the average frequency in a COMPTON process are derived. An appendix deals with the process in a body with finite dimensions.
INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR.

KOMPANEYETS, A.S.

Kompaneec, A. S. The similarity problem in the development of a shock wave from a compression wave. Dokl. Akad. Nauk SSSR (N.S.) 107 [illegible] (Russian) 1-PW

The self similar, one dimensional [illegible] gas is considered, resulting from initial [illegible]

$$p_0 = B x^\alpha \ (x \gtrless 0), \qquad \rho_0 = \text{const}$$

$$p_0 = 0 \ (x < 0), \qquad v_0 = 0$$

[illegible] Here x denotes distance [illegible] pressure, density and velocity respectively [illegible] parameters. The physical variables [illegible]

$$p = \rho_0 \frac{x^2}{t^2} f(\xi), \quad v = \frac{x}{t} [illegible], \quad \rho = \rho_0 [illegible]$$

where

$$\xi = \left(\frac{B}{\rho_0}\right)^{[illegible]} [illegible]$$

From the Eulerian equations of [illegible] differential equation of the first order may [illegible] determine φ as a function of ω where [illegible] curves of this equation are calculated and [illegible] singularities at the points [illegible]

KOMPANEYETS, A.S.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1426
AUTHOR KOMPANEEC, A.S.
TITLE The Shock Waves in a Plastically Compressible Medium.
PERIODICAL Dokl.Akad.Nauk, 109, fasc.1, 49-52 (1956)
Issued: 9 / 1956 reviewed: 10 / 1956

Here the shocklike propagation of a plastic deformation in a medium with the following properties is investigated: In the initial state it has the density ϱ_o, and with this density it offers a negligibly small resistance to compressions. The medium which attains the density ϱ_1 is incompressible and in this state it is plastic. The absolute value of the highest tangential tension is, in this case, supposed to depend on the average vertical tension (plasticity condition by PRANDTL). Such a plasticity exists, for example, in sand. The shock wave is produced as a result of an explosion in a certain and rather small spherical space with the radius R_o. The main axes of the tension tensor are identical with the coordinate lines of a spherical system the center of which is in the center of the explosion. The principal vertical tensions are here called σ_r and $\sigma_\theta = \sigma_\varphi$. The condition of plasticity is $\sigma_r - \sigma_\theta = k + m(\sigma_r + 2\sigma_\theta)$. Next, the equations of motion of the compressed medium are written down and herefrom an expression for σ_r is derived. Also the boundary conditions for the front of the shock wave are explicitly given. On the boundary of the widening cavity pressure must be put equal to negative vertical tension: $p = -\sigma_r(R_o)$. The radius of the cavity can easily be determined from the constance of mass, and we finally find:

INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR

KOMPANEYETS, Alesksandr Solomonovich

KOMPANEYETS, Aleksandr Solomonovich; RATNER, S.B., redaktor; TUMARKINA, N.A., tekhnicheskiy redaktor

[Theoretical physics] Teoreticheskaia fizika. Izd. 2-oe, perer. i dop. Moskva, Gos.izd-vo tekhniko-teoret. lit-ry, 1957. 563 p.
(Physics) (MLRA 10:9)

3

Kompaneets, A. S.; and Pavlovskii, E. S. The self-consistent field equations in an atom. [illegible] Physics. JETP 4 (1957), 328-336 [illegible]

2-FW

Following a method [illegible] ... bridge Philos. Soc. 26 [illegible] ... Hamiltonian is derived [illegible] ... tent field equations which [illegible] ... matrix. A suitable [illegible] ... commutator is expanded [illegible] ... is the [illegible] ... Thomas-Fermi equation [illegible] ... first correction [illegible] ... inhomogeneous second [illegible] ... contains the well-known [illegible] ... by Dirac [illegible] as well as [illegible]

KOMPANEYETS, A. S. (Moscow, USSR)

Application de la methode de champ self-consistant aux noyaux atomiques.

report presented at the Intl. Congress for Nuclear Interactions (Low Energy) and Nuclear Structure (Intl. Union Pure and Applied Physics) Paris, 7-12 July 1958.

KOMPANEYETS, A.S., doktor fiz.-mat.nauk

Relativity and gravity. Znan.sila 33 no.12:14-18 D '58.
(MIRA 11:12)

(Relativity (Physics)) (Gravitation)

AUTHOR: Kompaneyets, A. S. 56-34-4-26/60

TITLE: Strong Gravitation Waves in the Empty Space (Sil'nyye gravitatsionnyye volny v pustote)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 953 - 955 (USSR)

ABSTRACT: This work generalizes the results by A. Einstein and N. Rosen (Reference 1) to the case of two gravitation waves which are in interaction. Einstein and Rosen showed that the equation of the propagation of a strong gravitation wave (which in passing to the limit corresponds to a weak transverse-transverse wave of the form $g_{22}-g_{33}$) leads to a linear propagation equation of the cylindric wave. It can be shown that also a more general form of a strong gravitation wave (which in passing to the limit corresponds to a superposition of waves of the form $g_{22}-g_{33}$ and g_{23}) permits very similar generalizations. The author starts with a line element of the shape $-ds^2 = Adx_1^2 + Cdx_2^2 + 2Bdx_2dx_3 + Ddx_3^2 - Adx_4^2$. On this occasion A,B,C,D depend only on x_1 and x_4 which in passing to the limit

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Strong Gravitation Waves in the Empty Space 56-34-4-26/60

corresponds to a plane wave. The coordinates x_1 and x_4 are chosen so that $g_{11} = -g_{44}$, $g_{14} = 0$ is valid. The Christoffel symbols of the second kind, which result in this case, are written down explicitly. A part of these Christoffel symbols is equal to zero. Only the components $R_{11}, R_{14}, R_{44}, r_{22}, R_{33}, R_{23}$ of the contracted tensor of curvature are different from zero. This gives six equations for the quantities A,B,C, D and therefore the compatibility of these terms must be proved. This is made in this work under special choice of the system of coordinates. The choice of the system of coordinates was already subjected to the conditions $g_{11} = -g_{44}$ and $g_{14} = 0$. The remaining 2 conditions are in the 2 remaining equations (over the 4 necessary equations). First the equations $R_{ik} = 0$ for the components 2 and 3 are written down. Then the compatibility of the whole system of the gravitation equations for the chosen parameters is proved. Though the system ascertained here of the hyperbolic equations is not linear their characteristics are the lines $x_1 = \pm x_4$. Therefore also strong gravitation waves, similar to the weak

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Strong Gravitation Waves in the Empty Space 56-34-4-26/60

waves, propagate with light velocity. Besides the characteristics of each family do not intersect. Therefore the nonlinear hyperbolic equations of the gravitation do not cause the necessity of the production of shock waves. This makes these equations differ, for instance, from the equations of gas dynamics, which belong to the same class. The occurring of shock waves would disagree with the Riemann character of metrics. Thus the investigation made shows once again the internal agreement of the Einstein equations of the field of gravitation. Finally the author thanks V. L. Ginzburg for the indication of the most important literature sources. There are 2 references, 1 of which is Soviet.

ASSOCIATION: Institut khimicheskoy fiziki (Institute of Chemical Physics)

SUBMITTED: November 11, 1957

1. Gravity--Mathematical analysis

Card 3/3

SOV/56-34-5-33/61

AUTHORS: Zel'dovich, Ya. B., Kompaneyets, A. S., Rayzer, Yu. P.

TITLE: On Radiation Cooling of Air. I (Ob okhlazhdenii vozdukha izlucheniyem. I) General Description of the Phenomenon and the Weak Cooling Wave (Obshchaya kartina yavleniya i slabaya volna okhlazhdeniya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 5, pp. 1278-1287 (USSR)

ABSTRACT: This paper discusses the approximation theory of the cooling wave and the fact is established that in this layer the temperature abruptly decreases from the initial value to the "temperature of transparency" T_2. A diagram shows the successive changes of the temperature distributions, by taking adiabatic cooling into account. The authors try to find the solution of the nonsteady equations of the radiating heat exchange. These solutions have the form $T(x - ut)$ and correspond to a plane wave propagated with the constant velocity in the gas at the given temperature T_1 and with the density ϱ_1. But these equations are not solved by exact solutions of the kind

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SOV/56-34-5-33/61

On Radiation Cooling of Air. I. General Description of the Phenomenon and the Weak Cooling Wave

$T(x - ut)$. The causes of this fact are discussed. If the cooling wave propagates in expanding air, adiabatic cooling transports the air layers, which were cooled by the radiation into a region of temperatures so low that they become practically transparent. The authors do not investigate the additional absorption of the light at low temperatures due to oxide and dioxide of nitrogen produced in the heated air. Moreover, the intense molecular absorption at low temperatures (which is essential for the ultraviolet radiation with 2000 Å) is neglected. There are two ways of taking the real facts into account. First, it is possible to introduce an additional constant term A (which characterizes adiabatic cooling) into the energy equation. Secondly, it is possible to exclude from the investigation the weakly absorbing gas region which is cooled below the temperature of transparency. In order to determine the radiation flux, the authors apply the diffusion approximation to the exact kinetic equation which takes into account the angular distribution of the radiation in an approximate manner. In a great part of the cooling wave the true radiation density U is very similar to its equilibrium value U_p. In the region with cooled air,

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On Radiation Cooling of Air. I. General Description of the Phenomenon and the Weak Cooling Wave

SOV/56-34-5-33/61

however, U is very different from U_p. Lastly, the authors calculate the special case where T_1 is only a little higher than T_2. In this case it is possible to find the exact analytical solution of this problem. There are 5 figures, 1 table, and 6 references, 5 of which are Soviet.

ASSOCIATION: Institut khimicheskoy fiziki (Institute of Chemical Physics)

SUBMITTED: December 20, 1957

1. Air—Cooling—Applications 2. Heat transfer—Theory 3. Mathematics

Card 3/3

AUTHORS: Zel'dovich, Ya.B., Kompaneyets, A. S., Rayzer, Yu. P. SOV/56-34-6-11/51

TITLE: On Air Cooling by Radiation (Ob okhlazhdenii vozdukha izlucheniyem)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 34, Nr 6, pp 1447 - 1454 (USSR)

ABSTRACT: The first part of this investigation discussed the cooling of a great volume of heated air in a qualitative manner, it dealt with weak cooling waves. This paper, however, deals with the theory of a strong cooling wave in which the higher temperature may be infinitely high. This paper has to determine the radiation flux which moves from the front of the cooling wave towards infinity and to obtain the temperature distribution on front of the cooling wave. One of the following two methods has to be used: either to introduce a constant term into the energy equation or to determine from the very beginning the "transparency temperature" T_2 according to a formula given in the first part of this investigation. In the latter case one has

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to assume that the air is absolutely transparent for $T < T_2$. The first method gives a more complete description of the temperature distribution because it allows to investigate the change of the temperature in the cooled air and to take into account the absorption of the light in the air. But this method leads to unnecessary mathematical complications at temperatures above the transparency temperature. It is more advantageous to investigate the internal structure of the cooling wave according to the second method; the corresponding energy equation is given explicitly. The authors investigate the lower part of the cooling wave where the temperatures are similar to T_2. At the lower boundary of the cooling wave the density of the radiation is lower than the equilibrium density. Regardless of the amplitude of the cooling wave always the lower boundary of the cooling wave radiates, even at extremely high temperatures. This conclusion follows from the steadyness of the profile of the cooling wave. The second part of this paper calculates the distribution of the temperature in the cooling wave and the last part of this paper deals with the lower margin of the cooling wave and with the transition

of the cooled air to the transparent zone. The processes taking place in the cooled air zone are essentially instationary and depend on the dimensions, on the hydrodynamic motions, and on the additional mechanisms of light absorption. The authors then investigate the practically important case where the air pressure had not yet decreased to the atmospheric pressure and where the air continues to get cooler by radiation. The processes with adiabatic cooling are quasistationary processes in the whole interesting region. The point where the cooling of the air by radiation ends may be considered as the lower boundary of the cooling wave and the temperature in it - as the transparency temperature for a given value A of the adiabatic cooling. The transparency temperature depends only logarithmically on A and on the amplitude of the cooling wave. The authors thank N.N. Semenov for his stimulating discussions. There are 5 figures and 2 references, 2 of which are Soviet.

On Air Cooling by Radiation SOV/56-34-6-11/51

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute for Chemical Physics, AS USSR)

SUBMITTED: December 20, 1957

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2(5), 7(7) SOV/56-35-6-33/44

AUTHOR: Kompaneyets, A. S.

TITLE: Radio Emission in an Atomic Explosion (Radioizlucheniye atomnogo vzryva)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 6, pp 1538-1541 (USSR)

ABSTRACT: G. M. Gandel'man and L. P. Feoktistov investigated the manner in which an electromagnetic field can be produced in air under the influence of γ-quanta. They suggested the following scheme: The quanta knock out Compton (Kompton)-electrons which, on their flight, produce a large number of secondary electrons; the latter render the air conductive, and in this way a current is produced which endeavors to annihilate the existing field. If emission of the γ-quanta is asymmetric, the current emits an electromagnetic pulse of the duration of one or several microseconds, i.e. radiowaves in the meter range. O. I. Leypunskiy pointed out the origin of oscillations of longer waves. The electrons do not unite with positive ions but mainly with neutral O_2-molecules, so that the air acquires ionic conductivity. An asymmetric ion current leads, as the calculations in the present paper show, to radio pulses of

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Radio Emission in an Atomic Explosion SOV/56-35-6-33/44

a sensible order of magnitude with expected duration. The primary field is first investigated; multiple scatterings of quanta are not taken into consideration as being effects of second order. The results obtained by the author agree with the estimates made by Leypunskiy. In the second part of the paper the electromagnetic oscillations are investigated. It was found that the duration of the vibrations in each half wave is of the order of 2 microseconds, and for equal asymmetry of gamma emission the amplitude of vibrations depends only weakly on total emission. The author finally thanks O. I. Leypunskiy, who pointed out the part played by the ionic conductivity of air in connection with the production of radio signals, and who stimulated work by his discussions. He further thanks A. A. Milyutin, S. L. Kamenomostskaya and V. I. Kozhevnikov for carrying out calculations, and finally, also A. A. Dorodnitsyn, and M. V. Keldysh, who placed the computer at his disposal. There are 1 figure and 2 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute for Chemical Physics of the Academy of Sciences, USSR)

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KOMPANEYETS, A.S.

21 (0), 24 (0)

AUTHOR: Tyagunov, G. A. SOV/89-7-2-18/24

TITLE: Scientific Conference of the MIFI (Nauchnaya konferentsiya MIFI)

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr 2, pp 176-177 (USSR)

ABSTRACT: The yearly scientific meeting was held from 17 April to 15 May 1959 in the Moskovskiy inzhenerno-fizicheskiy institut (Moscow Physical Engineering Institute). More than 600 participants from 100 different institutes attended the 2 plenary and 18 sectional conferences. A total of 148 lectures were held. The following lectures are specially mentioned: M. K. Romanovskiy on the thermo-nuclear examinations, N. G. Basov on the physical foundations of molecular generators and amplifiers, A. I. Leypunskiy on the construction of a fast reactor, I. Ya. Pomeranchuk on the theory of the peripheral collision of mesons and nucleons, A. B. Migdal on superfluidity and momentum of inertia of the nuclei, A. S. Kompaneyets on the strong electromagnetic gravity wave, V. I. Gol'danskiy on levels which are excited within the nucleus shell and methods of comprehending them, I. L. Rozental' and L. A. Prokhorova on the analysis of the possible experiments for the determination of the measurements of the μ-mesons, N. I. Dianov-Klokov on the spectrum of liquid and crystalline hydrogen under pressure (6000-10000 atm) and an instrument for measuring the absorption curves, I. L. Lyapidevskiy and G. V. Glagolev on new application possibilities of the diffusion chamber, A. V. Shal'nov on calculation methods for linear electron accelerators with migratory waves, P. A. Krasin, A. D. Minervin and A. I. Zaboyev on new theories of the electron capture under betatron conditions of the acceleration,

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Ya. G. Pratnov on optimum wave length for a generator, S. P. Lomnev and G. A. Tyagunov on magnetic focusing in a linear electron accelerator, O. A. Val'dner, P. A. Dmitrovskiy, N. M. Zorin, Yu. V. Klein on the 3 new linear accelerators of the MIFI, and V. V. Kuznetskiy, O. A. Val'dner, V. V. Kotov and L. N. Chasnokov on examination of the electron movement in the system of the elutron with consideration of the scattering fields, O. A. Krayev on impulse method for measuring the heat conduction capacity of liquids and the theory of this method, Ya. V. Khabakhpasheva, Yu. M. Il'in and D. A. Chirov on heat transmission to the eutectic Na-K which flows in a circular space, L. V. Petrovichev on heat transmission to circulating mercury, N. N. Royzin on special conditions when working with a flat triode in

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the impulse technique, G. S. Potirayev on calculation methods and construction of an impulse transformer for instruments with semi-conductor elements, Ya. A. Khetagurov on a possibility judge the characteristics of magnetic recording of impulses, B. I. Kal'nin on the element system for a universal digital computer, V. S. Malov on multiple control of the parameters of technologic processes, P. I. Popov on analysis of several systems with which physical energy apparatus can be automatically started, Yu. I. Topcharov on a method to examine the quality of a reactor control when the reactivity changes stepwise or linearly. G. A. Leont'yev and A. I. Yevstyukhin on examination of the iodine method of refining niobium and characteristics of the metal obtained, P. L. Gruzin and G. G. Ryabova on examination of the micro-distribution of carbon, tungsten, iron and other elements in zirconium and its alloys by use of auto-radiography, G. B. Fedorov on determination of the sublimation heat of zirconium and nickel by using radioactive indicators and G. B. Fedorov and A. V. Smirnikhin on determination of the diffusion coefficients of chromium, nickel, iron and chromium nickel steels. The literature for all these lectures will be published by the MIFI in a symposium.

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APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000824120015-8"

9(3) SOV/25-59-9-8/49

AUTHORS: Kompaneyets, A.S. (Moscow), Doctor of Physico-Mathematical Sciences; Kaganov, M.I. (Khar'kov), Candidate of Physico-Mathematical Sciences

TITLE: Electrical Conductivity

PERIODICAL: Nauka i zhizn', 1959, Nr 9, pp 24 - 29 (USSR)

ABSTRACT: The editor refers to the lecture "The 21st Congress of the CP USSR and the Tasks of Science" presented by the vice-president of the AS USSR, A.V. Topchiyev, at the general yearly assembly of the AS USSR. A.V. Topchiyev stated that the development of new and improved devices and apparatuses, using semi-conductors, e.g. diodes, triodes, rectifiers, photo- and thermogenerators, refrigerators for technical and private needs, is a most important task. The authors of the present article give general explanations of the fundamental principles of electrical conductivity. By means of an example with two elements - helium and lithium - they prove that crystals of a compact for-

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Electrical Conductivity SOV/25-59-9-8/49

mation are dielectrics and that those of loose formation are conductors. Besides metals, there exists still another class of crystal electronic conductors e.g. elements of silicon, germanium and selenium. Their electrical conductivity is much lower than that of metals and therefore they are called semi-conductors. There are 9 diagrams and 1 drawing.

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16.7800, 24.2000, 16.8100, 16.8300

76988
SOV/56-37-6-28/55

AUTHOR: Kompaneets, A. S.

TITLE: Propagation of a Strong Electromagnetic-Gravitational Wave in Vacuum

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 6, pp 1722-1726 (USSR)

ABSTRACT: A theoretical analysis showed that a strong electromagnetic-gravitational wave possesses a system of rectilinear and parallel characteristics, and therefore the velocity of the propagation of any small addition perturbation will always be equal to that of light. It thus cannot be expected that there exist solutions with a Euclidean metric at infinity that can differ qualitatively from the ordinary electromagnetic waves in finite spatial regions. The propagation of the wave was described by the matrix:

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$$-ds^2 = Adx_1^2 + Cdx_2^2 + 2Bdx_2\,dx_3 + Ddx_3^2 - Adx_4^2, \qquad (1)$$

(cf. A. S. Kompaneets, Zhur. eksp. i teoret. fiz., 34, 953, 1958). The coefficients A, B, C, D were considered as the functions only from x_1 and x_4.

The Maxwell equation for the countervariant components of the electromagnetic filed had the following form:

$$\frac{\partial}{\partial x_1}(F^{14}\sqrt{-g}) = 0, \qquad (2a)$$

$$\frac{\partial}{\partial x_1}(F^{21}\sqrt{-g}) + \frac{\partial}{\partial x_4}(F^{24}\sqrt{-g}) = 0, \qquad (2б)$$

$$\frac{\partial}{\partial x_1}(F^{31}\sqrt{-g}) + \frac{\partial}{\partial x_4}(F^{34}\sqrt{-g}) = 0, \qquad (2в)$$

$$\frac{\partial}{\partial x_4}(F^{41}\sqrt{-g}) = 0. \qquad (2г)$$

The tensor component of the energy-momentum from these relations was:

$$T_{11} = T_{44} = {}^1/_2 (F_{12} F_1^2 + F_{13} F_1^3 + F_{42} F_4^2 + F_{43} F_4^3). \qquad (3)$$

The expansion of these relations gave the following wave equations for the electromagnetic field:

$$\frac{1}{x_1} \frac{\partial}{\partial x_1} x_1 F_1^2 - \frac{\partial F_4^2}{\partial x_4} = 0, \qquad \frac{1}{x_1} \frac{\partial}{\partial x_1} x_1 F_1^3 - \frac{\partial F_4^3}{\partial x_4} = 0;$$

$$\frac{\partial}{\partial x_4} C F_1^2 + \frac{\partial}{\partial x_4} B F_1^3 - \frac{\partial}{\partial x_1} C F_4^2 - \frac{\partial}{\partial x_1} B F_4^3 = 0,$$

$$\frac{\partial}{\partial x_4} B F_1^2 + \frac{\partial}{\partial x_4} D F_1^3 - \frac{\partial}{\partial x_1} B F_4^2 - \frac{\partial}{\partial x_1} D F_4^3 = 0. \qquad (14)$$

Based on these results, it is doubtful that the so-called "geons" exist, as proposed by A. Wheeler (cf. Phys. Rev., 97, 1511, 1955). Similarly, the predictions of Wheeler (cf. Ann. Phys., 2, 525, 1957) that the existence or the absence of charges is due to the topological link of the space appears

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Propagation of a Strong Electromagnetic-Gravitational Wave in Vacuum

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SOV/56-37-6-28/55

to have no ground. There are 7 references, 3 Soviet, 1 German, 3 U.S. The U.S. references are: A. Wheeler. Ann. of Phys. 2, 525 (1957); A. Einstein, N. Rosen, Journ. of Franklin Inst., 223, 43, (1937); A. Wheeler. Phys. Rev., 97, 1511 (1955).

ASSOCIATION: Inst. Chem. Phys. Acad. Sciences USSR, USSR (Institut khimicheskoy fiziki Akademii nauk SSSR, SSSR)

SUBMITTED: July 1, 1959

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9.3120

66413
SOV/20-128-6-17/63

AUTHOR: Kompaneyets, A. S.

TITLE: Influence of a Space Charge on Autoelectron Emission

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 6, pp 1160-1162 (USSR)

ABSTRACT: Current densities of the order of magnitude 10^7 a/cm^2 are obtained today in experiments of autoelectron emission. With such current densities the space charge field is of the same order of magnitude as the field computed from the total potential difference and from the geometrical configuration of the device which is actually rather spherical than plane. An exact solution of the problem of spherical diodes was supplied by V. L. Kan (Ref 2), and was extended by R. P. Poplavskiy (Ref 3) to the case in which the field strength on the cathode is not equal to zero. The solution by Kan and Poplavskiy may be represented in a parametric form as follows:

$$\frac{R}{r} = x^{4/3}y^{2/3}\left[I_{1/3}(y)K_{-2/3}(x) + K_{1/3}(y)I_{-2/3}(x)\right]^2$$

$$\frac{V}{(k'J)^{2/3}} = y^{2/3}\left[\frac{I_{-2/3}(y)K_{-2/3}(x) - K_{-2/3}(y)I_{-2/3}(x)}{I_{1/3}(y)K_{-2/3}(x) + K_{1/3}(y)I_{-2/3}(x)}\right]^2;$$

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Influence of a Space Charge on Autoelectron Emission SOV/20-128-6-17/63

function, say, equal to $w = 4.6$ ev. On the assumptions made here it follows that $j = 1.29 \cdot 10^{16}$ CGSE and $V = 75.4$ CGSE. Without considering the space charge one would obtain $V = 66.7$ CGSE, so that the space charge is increased by the potential difference by 13%. A completely different result is obtained for a plane diode. With $d = R$ one obtains $\alpha = 1.83$ and $v = 2.88$. This corresponds to an almost treble increase of the potential. For large current densities, many authors recommend the introduction of a correction for the mapping force. The problem dealt with here is reduced to the simultaneous solution of a Schroedinger equation and a Poisson equation, and no classic mapping force can be contained in the potential φ. The influence of the space charge not surpassing the barrier is of the second order with respect to the total penetrability. A formula is written down for the penetrability of the barrier. The author thanks G. N. Shuppe for pointing to the problem under review, Ya. B. Zel'dovich for an important discussion of results, and Yu. S. Sayasov and G. A. Grinberg for their indications concerning the solvability of the problem for a spherical diode, and for reference to publications. There are 6 references, 5 of which are

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66413

Influence of a Space Charge on Autoelectron Emission SOV/20-128-6-17/63

Soviet.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences, USSR)

PRESENTED: June 18, 1959, by V. N. Kondrat'yev, Academician

SUBMITTED: June 15, 1959

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KOMPANEYETS, A.S.

Effect of volume charge on the electrostatic emission of electrons from a metal. Trudy SAGU no.148:117-125 '59. (MIRA 13:7)

(Electric fields) (Electron emission)

KOMPANEYETS, A.S.

Propagation of a strong electromagnetic gravitational wave in a vacuum. Zhur.eksp.i teor.fiz. 37 no.6:1722-1726 D '59.
(MIRA 14:10)

1. Institut khimicheskoy fiziki AN SSSR.
(Electromagnetic waves) (Gravitation)

KOMPANEYETS, A S

Theory of detonation, [by] Ya. B. Zeldovich and A.S. Kompaneyets. New York and London, Academic Press, 1960.
284 p. Diagrs., Graphs.
Translated from the original Russian: Teoriya detonatsii, Moscow, 1955.

KOMPANEYETS, A.S.

"On the Bond in the Nuclear Molecule C^{12}-C^{12}"

report submitted for the 2nd USSR Conference on Nuclear Reactions at Low and Intermediate Energies, Moscow, 21-28 July 1960.

S/109/60/005/008/017/024
E140/E355

9.3140 (2301,1003,1140)

AUTHOR: Kompaneyets, A.S.

TITLE: The Effect of Space Charge on Field Emission

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol. 5, No. 8, pp. 1315 - 1317

TEXT: This purely theoretical note indicates that the image forces employed in calculating the potential behind a barrier, required by classical theory, are incompatible with a quantum mechanical approach. The potential behind the barrier is determined from the Poisson equation by the method of self-matched fields, the solution being valid for all cases where the transparency factor is greater than unity. There are 4 references: 2 Soviet and 2 non-Soviet.

SUBMITTED: December 21, 1959

Card 1/1

88446

S/056/60/039/006/038/063
B006/B063

24.6100

AUTHOR: Kompaneyets, A. S.

TITLE: The Bond in the $C^{12} - C^{12}$ Nuclear Molecule

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 6(12), pp. 1713 - 1715

TEXT: Recent C-C scattering experiments indicated the existence of resonance quasi-levels which are ascribed to a "molecular" state with a lifetime in the order of 10^{-21} sec. The author has now made a theoretical study of this problem, which shows that quasi-stable states of two nuclei can exist at nuclear distances larger than the diameters of the peripheral nuclear zone. The bond in this quasi-molecule is ascribed to the orbit of a strongly excited neutron, which the two nuclei have in common. If the energy of this neutron is close to the ejection threshold, then the wave function outside the nucleus is attenuated at distances that are greater than the radius of action of the nuclear forces. Calculations have shown that the force resulting from

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The Bond in the C^{12} - C^{12} Nuclear Molecule S/056/60/039/006/038/063 B006/B063

case the probability of neutron excitation is less than in the case of C^{12}. A. S. Davydov and K. A. Ter-Martirosyan are mentioned. There are 3 references: 1 Soviet, 1 US, and 1 Dutch.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences USSR)

SUBMITTED: June 13, 1960 (initially) and August 31, 1960 (after revision)

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S/020/60/130/05/013/061
B013/B014

AUTHOR: Kompaneyets, A. S.

TITLE: A Point Explosion in an Inhomogeneous Atmosphere

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 5, pp 1001-1003 (USSR)

ABSTRACT: The author solves the above-mentioned problem by a semiclassical method. The propagation of waves is described using the conditions which hold on the shock wave itself. Linearization is not permissible for an explosion in a strongly dilute atmosphere. The problem with three variables is very difficult to integrate. It is, however, possible to apply a semiclassical method which is based on the only essential singularity of the exact centrally symmetric solution. In the case of such a solution, energy is almost evenly distributed over the entire volume of the explosion wave, and only near the wave front it is two or three times as large as the value averaged over the entire volume. In this region also the entire mass of the substance is concentrated. Explosion waves in an inhomogeneous atmosphere are also assumed to have the same properties. If the pressure inside the wave is spatially constant, and if the mass density equals zero, the hydrodynamic equations in the main part of the

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volume are satisfied in a trivial manner. For the purpose of describing the wave propagation it is necessary to apply the conditions holding on the shock wave itself. In cylindrical coordinates, one obtains for the wave front the equation

$$\left(\frac{\partial r}{\partial y}\right)^2 - e^{-z/z_0}\left[\left(\frac{\partial r}{\partial z}\right)^2 + 1\right] = 0 .$$

z_0 denotes the equivalent thickness of the atmosphere, y an auxiliary variable defined by

$$y = \int_0^t \frac{dt}{\sqrt{V}}\sqrt{\frac{\lambda E(\gamma^2 - 1)}{2\varrho_0}},$$

and ϱ_0 = the initial air density at the point of explosion ($z = 0$). This differential equation is solved by separation of the variables. With small t and y one obtains

$$r = 2z_0 \arccos\left[\frac{1}{2}\, e^{z/2z_0}\left(1 - x^2 + e^{-z/z_0}\right)\right],$$

where $x = y/2z_0$ holds. For the positions of the highest and the lowest point z_1 and z_2 of the wave one obtains $e^{-z_{1,2}/2z_0} = 1 \mp x$. For the position and the maximum radius of the wave one obtains

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KOMPANEYETS, Aleksandr Solomonovich; FAYNBOYM, I.B., red.; NAZAROVA, A.S., tekhn. red.

[Space and time in the relativity theory] Prostranstvo i vremia v teorii otnositel'nosti. Moskva, Izd-vo "Znanie," 1961. 60 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.9, Fizika i khimiia, no.18/20) (MIRA 14:11)
(Space and time) (Relativity (Physics))

IVANENKO, D.D., prof., doktor fiziko-matematicheskikh nauk; SHIROKOV, M.F., prof., doktor fiziko-matematicheskikh nauk; GERTSENSHTEYN, M.Ye., kand.fiziko-matematicheskikh nauk; KOMPANEYETS, A.S., prof., doktor fiziko-matematicheskikh nauk

Do gravity waves exist? Znan. sila 36 no.12:6-7 D '61.
(MIRA 15:1)

(Gravitation)

26716
S/056/61/041/005/031/038
B102/B138

26.5300

AUTHORS: Kompaneyets, A. S., Lantsburg, Ye. Ya.

TITLE: Heating of gas by radiation

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 5(11), 1961, 1649 - 1654

TEXT: Radiative heat propagation from a hot region ($T \sim 10^6$ °K) into a cold gas is investigated theoretically. An exact solution of the problem is only possible when the integral equation of the radiative heat transfer is solved. When, however, the range of radiation varies considerably with T the problem can be solved more simply. R is the size of the heated region. Then the temperature T_o at which the range l is of the order of R is given by $l(T_o) = R$; T_o is only weakly dependent on R if l(T) is a strong function. The heated region is divided into two: an inner region which is so hot that it is transparent for radiation, and an outer one which is opaque and forms the boundary layer to the cold gas. It is assumed that the role of the inner region in the energy balance can be

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the energy balance equation. In diffusion approximation $S = -\frac{1}{3}\, l' c \partial U/\partial x$. The boundary conditions for these equations read as follows: $T = T_0$, $U = U_1$ and $T = 0$, $S = 0$, $U = 0$. With $d\tau = dx/l(T)$ (x coincides with the temperature gradient) and

$$\gamma = \frac{aT_0^4}{\varepsilon(T_0)},\quad \beta = \frac{v}{c},\quad u = \frac{U}{aT_0^4}\left(\frac{\gamma}{\sqrt{3}\beta}\right)^{1/4},\quad s = \frac{\sqrt{3}S}{caT_0^4}\left(\frac{\gamma}{\sqrt{3}\beta}\right)^{1/4},$$

$$u_1 = \frac{U_1}{aT_0^4}\left(\frac{\gamma}{\sqrt{3}\beta}\right)^{1/4},\quad u_p = \left(\frac{T}{T_0}\right)^4\left(\frac{\gamma}{\sqrt{3}\beta}\right)^{1/4},\quad u_{p_0} = \left(\frac{\gamma}{\sqrt{3}\beta}\right)^{1/4}. \tag{8}$$

Eq. (5) can be solved. $s = u_p^{1/4} + \sqrt{3}\beta u$ and the ordinary differential equation

$$\frac{ds}{du} = \sqrt{3}\beta + \frac{u - u_p}{s} = \sqrt{3}\beta + \frac{u}{s} - \frac{(s - \sqrt{3}\beta u)^4}{s} \tag{10}$$

can be derived. The physically meaningful solutions, for which $\beta = v/c \leqslant 1$, often require the inequality $U \ll \varepsilon$ to be satisfied. In this case Eq. (10) changes into $ds/du = \sqrt{3}\beta + u/s - s^3$ (11) with $s = 0$ for $u = 0$ and $u = u_1$ for $u_p = u_{p_0}$. Then the wave velocity can be found from $s(u_1; \beta) = u_{p_0}^{1/4}$;

this is demonstrated graphically. The results show that the true radiative energy density u is always greater than the equilibrium density u_p, which is a necessary condition for the propagation of a thermal wave. Integration of Eq. (11) is carried out for the following special cases: 1) $(T_1-T_o)/T_1 \ll 1$, 2) $T_1 \gg T_o$, but $U_1 \ll \varepsilon(T_o)$, and 3) $\gamma \ll 1$, T_1/T_o is of the order of unity. For these three cases the solutions for $\beta \ll 1$ read as follows: (1): $\beta = v/c = \frac{4}{3} \frac{\gamma}{\sqrt{1+\gamma}} \left(\frac{T - T_o}{T_1}\right)^{1/2}$; (2): $\beta = U_1/\sqrt{3}\,\varepsilon(T_o)$ and (3): $\beta = v/c = \frac{1}{\sqrt{3}} \frac{\gamma}{u_1^{3/4}} \left(\frac{T_1}{T_o}\right)^3$. The authors thank Yu. P. Rayzer for discussions. There are 2 figures and 11 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: June 12, 1961

Card 4/5

KOMPANEYETS, A.S., prof.

Gravitation, space, and time. Priroda 50 no.5:17-23 My '61. (MIRA 14:5)

1. Institut khimicheskoy fiziki AN SSSR (Moskva).
(Mechanics, Celestial)

KOGAN, A.M. (Moskva); KOMPANEYETS, A.S. (Moskva); KRAYNOV, V.P. (Moskva)

Propagation of a strong explosion in an inhomogeneous medium. PMTF no.6:3-7 N-D '62. (MIRA 16:6)

1. Institut khimicheskoy fiziki AN SSSR.
(Explosions)

SHUPPE, G.N.; KOMPANEYETS, A.S.

Concerning V.A. Gor'kov's article "The first symposium on field emission." Radiotekh. i elektron. 7 no.9:1686 S '62. (MIRA 15:9)

(Field emission) (Gor'kov, V.A.)

KOMPANEYETS, A.S.; LANTSBURG, Ye.Ya.

Analyzing the propagation of a nonequilibrium thermal wave on the assumption of a finite velocity of light. Zhur. eksp. i teor. fiz. 43 no.1:2[illegible]4-240 Jl '62. (MIRA 15:9)

1. Institut khimicheskoy fiziki AN SSSR.
(Heat—Transmission) (Light—Speed)

S/056/62/043/006/037/067
B125/B102

AUTHOR: Kompaneyets, A. S.

TITLE: The regularization of the classical equations of electrodynamics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 6(12), 1962, 2185 - 2187

TEXT: A relativistically invariant, stable, and cylindrical model of an extended charge can be obtained by compensating the electromagnetic field and the "meson" field without introducing a new constant into the theory. In the rest system of the charge as a whole the usual equalities $\Delta\varphi = -4\pi\varrho$ (2), $\Delta\psi + \varkappa^2\psi = 4\pi\varrho\lambda$ (3), $\varrho(\vec{E}+\lambda\vec{F}) = 0$ (4) follow from the relativistically invariant Lagrangian. φ, ψ and ϱ are the time components of the potentials and the current density, and $\vec{E}$ and $\vec{F}$ are the electrostatic and "mesostatic" fields. The first solution $\varrho = 0$ of the equation (4) for the equilibrium of the forces holds for $r > r_0$, whereas the second solution $\vec{E} = -\lambda\vec{F}$ holds within the sphere $r \leqslant r_0$ occupied by the charge.

Card 1/3

Substituting φ in (2) and (3), the solutions arrived at are given by $4\pi\varrho = -\lambda\kappa^2\psi/(1-\lambda^2)$ and $\Delta\psi = -\kappa^2\psi(1-\lambda^2)$ for $r \leqslant r_0$, $\Delta\psi = -\kappa^2\psi$ for $r > r_0$, where $\varphi = -\lambda\psi + C$. The meson field is a variable in space outside the charge, also but its small spatial period prevents it being observed. The other variable, involving a meson field that is quickly damped in space, cannot be brought into a stable equilibrium with the electrostatic fields. Owing to the continuity of the electrostatic potential and of the electrostatic field

$$C = \frac{e}{r_0}\left[1 - \frac{\lg \nu\kappa r_0}{\nu\kappa r_0}\right]^{-1}, \qquad (9)$$

is obtained, where $\nu = (1-\lambda^2)^{-1/2}$, leading to

$$\mathscr{E} = \frac{1}{2}\int \rho\,(\varphi + \lambda\psi)\,dv = \frac{C}{2}\int \rho\,dv = \frac{Ce}{2}. \qquad (11)$$

and, because of

$$\nu = \frac{\pi}{2\kappa r_0} + \varepsilon, \qquad (12)$$

The regularization of... S/056/62/043/006/037/067
B125/B102

to

$$\mathcal{E} = \frac{e^2}{2r_0}\left[1 + \frac{\operatorname{ctg} \varepsilon\varkappa r_0}{\pi/2 + \varepsilon\varkappa r_0}\right]^{-1}. \qquad (13)$$

for the charge energy. The minimum value (stable equilibrium) $\mathcal{E} = e^2\varkappa\varepsilon/3.54$ is about $\varepsilon\varkappa r_0 = 2.3$. The values $\varkappa\varepsilon = 3.54\ mc^2/e^2$ and $r_0 = 0.65e^2/mc^2$ are obtained by equating $\mathcal{E}$ and mc^2 (rest energy). It is the product $\varkappa\varepsilon$ only that is important and not the individual quantity.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: June 28, 1962

Card 3/3

35699

S/020/62/143/001/012/030
B104/B108

24.6730

AUTHORS: Zel'manov, I. L., Kompaneyets, A. S., and Sayasov, Yu. S.

TITLE: Phase motion of particles in accelerators with variable parameters

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 1, 1962, 72-73

TEXT: The phase oscillation equation of particles in an accelerator whose parameters have negligible random disturbances is in linear appoximation

$$\frac{d^2q}{dt^2} + \omega^2(t)\, q = a(t)\, \psi(t), \qquad (1),$$

q is the distance between the particle observed and an "ideal" synchronous particle, ψ is a random quantity characterizing the phase deviation of the synchronous particle from the "ideal" particle, $\omega^2(t)$ and a(t) are known functions slowly changing with time. The phase oscillations in an "ideal" accelerator are described by

$$\frac{d^2q_0}{dt} + \omega^2(t)\, q_0 = 0, \qquad (2),$$

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where $Q = q - q_0$ and $\dot{Q} = \dot{q} - \dot{q}_0$ characterize the deviations of the position and velocity of the particle observed from the "ideal" one. Assuming that $\overline{\psi(t)} = 0$, $\overline{\psi(t)\,\psi(t')} = \psi_0^2\,\delta(t - t')$ and that the solutions of (1) and (2) may be found in Wentzel-Kramers-Brillouin's approximation,

$$\frac{\partial \Phi}{\partial t} + \dot{Q}\frac{\partial \Phi}{\partial Q} - \omega^2 Q \frac{\partial \Phi}{\partial \dot{Q}} = \nu(t)\left(\frac{\partial^2 \Phi}{\partial Q^2} + \omega^2(t)\frac{\partial^2 \Phi}{\partial \dot{Q}^2}\right),$$

$$\nu(t) = \frac{\psi_0^2}{2\omega(t)}\left(\frac{a^2(t)}{\omega(t)} + \omega^2(t)\int_{t_0}^{t}\frac{a^2(\tau)}{\omega(\tau)}\,d\tau\right). \qquad (3)$$

is obtained for the probability density $\Phi(t, Q, \dot{Q})$. As a solution of (3),

$$\Phi = \frac{1}{4\pi\int_{t_0}^{t}\nu\omega\,dt}\exp\left(-\frac{Q^2}{\frac{4}{\omega}\int_{t_0}^{t}\nu\omega\,dt} - \frac{\dot{Q}^2}{4\omega\int_{t_0}^{t}\nu\omega\,dt}\right), \qquad (9)$$

is obtained. This solution holds for any dynamic system which has a potential $\frac{1}{2}\omega^2(t)q^2$ slowly changing with time, and which is affected by random forces $a(t)\psi(t)$. The references to the English-language publication reads as follows: S. Livingstone, Accelerators, 1956.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: October 16, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: October 10, 1961

KOMPANEYETS, Aleksandr Solomonovich; KOZLOV, V.D., red.;
KOLESNIKOVA, A.P., tekhn. red.

[Shock waves] Udarnye volny. Moskva, Fizmatgiz, 1963.
90 p. (MIRA 16:11)

(Shock waves)

IVANOV, Boris Nikolayevich; KOMPANEYETS, A.S., otv. red.; LARIN, S.I., red.izd-va; POLYAKOVA, T.V., tekhn. red.

[New physics; review of the fundamental principles of modern physics]Novaia fizika; obzor osnovnykh printsipov sovremennoi fiziki. Moskva, Izd-vo Akad. nauk SSSR, 1963. 134 p. (MIRA 16:3)

(Physics)

L 13845-63 EWT(1)/BDS AFFTC/ASD

ACCESSION NR: AP3003153 S/0056/63/044/006/2169/2172

52

51

AUTHOR: Kompaneyets, A. S.

TITLE: Classical model of charged particle with momentum

19

SOURCE: Zhurnal eksper. i teor. fiziki, v. 44, no. 6, 1963, 2169-2172

TOPIC TAGS: charged particles, classical electrodynamics

ABSTRACT: It is shown on the basis of equations proposed by the author in an earlier paper (ZhETF v. 43, 2185, 1962) that by balancing the repulsive electromagnetic field with an attractive meson field it is possible to construct a stable classical model of a charged particle possessing angular momentum. The model can be assumed to possess not only static charge density, but alsostationary current distribution. Such a model can exist without radiating, provided the electromagnetic force is balanced everywhere by the meson force. The model leads to a nonlinear system of equations which by some modification can be made complete and solved numerically if higher-order terms are neglected. Orig. art. has: 24 formulas.

ASSOCIATION: Institute of Chemical Physics Academy of Sciences

Card 1/2

KOMPANEYETS, A.S.

Diffusion from an instantaneous source in a gravitational field.
Dokl.AN SSSR 149 no.3:554-556 Mr '63. (MIRA 16:4)

1. Institut khimicheskoy fiziki AN SSSR. Predstavleno akademikom V.N.Kondrat'yevym.

(Diffusion)

KOMPANEYETS, A. S.

"Calculation of the Excited States of Atoms and Ions by the Self-Consistent Fields Method."

report submitted to 11th Intl Spectroscopy Colloq, Belgrade, 30 Sep-4 Oct 63.

KOMPANEYETS, Aleksandr Solomonovich, doktor fiz.-mat. nauk, prof.; FAYNBOYM, I.B., red.

[At the front edge of science; development of the fundamental laws of physics] Na perednem krae nauki; razvitie osnovnykh zakonov fiziki. Moskva, Izd-vo "Znanie," 1964. 46 p. (Novoe v zhizni, nauke, tekhnike. IX Seriia: Fizika, matematika, astronomiia, no.6) (MIRA 17:5)

KOMPANEYETS, Aleksandr Solomonovich; VIRKO, I.G., red.

[What is quantum mechanics?] Chto takoe kvantovaia mekhanika? Moskva, Nauka, 1964. 130 p. (MIRA 17:12)

ACCESSION NR: AP4032876 S/0051/64/016/004/0706/0708

AUTHOR: Kompaneyets, A.S.

TITLE: Field of light wave acting on an electron in the self-consistent field method

SOURCE: Optika i spektroskopiya, v.16, no.4, 1964, 706-708

TOPIC TAGS: electron wave function, electron transition, transition matrix element, atomic core field, self consistent field method

ABSTRACT: In calculation of atomic wave functions by the self-consistent field method the many-electron problem reduced to a one-electron one. Generally, the wave function of the optical electron is determined as though the electron were moving simply in the field of the nucleus and atomic core. I.B.Bersuker (Uch.zap.Kishenevsk univ. (fiz.mat.),24,63,1956) called attention to the fact that in calculating electron transition probabilities by this method one should bear in mind that the electron is acted on by a field distorted by the core. Initially, Bersuker took this distortion into account by treating the atomic core as a dielectric sphere located in the external field. In subsequent investigations (I.B.Bersuker, Opt.i spektro.9,

ACCESSION NR: AP4032876

685,1960; Izv.AN SSSR,Ser.fiz.22,750,1958, and I.B.Bersuker and M.G.Veselov,Izv.AN SSSR,Ser.fiz.22,662,1958) the problem was solved by a more rigorous quantum mechanical method in the adiabatic approximation. The purpose of the present brief note is to show that this approximation is not necessary; accordingly, there is derived a more general formula of the dispersion type, which in the low frequency limit transforms to the expressions derived in the later work of Bersuker (loc.cit.). It is noted that corrections for polarizability of the core can be introduced into the formula. "In conclusion, I thank A.V.Ivanova for indicating the pertinent literature." Orig.art.has: 8 formulas.

ASSOCIATION: none

SUBMITTED: 08Jul63 DATE ACQ: 07May64 ENCL: 00

SUB CODE: NP NR REF SOV: 004 OTHER: 000

Card 2/2

EWT(l)/EWP(m)/EEC(t)/T IJP(c) GW

TITLE: Solution of the equations of gravitat[illegible] homogeneous anisotropic model

[illegible] gas

AP5000354

of the equations can be analytically continued on both sides of the singularity. The solution involves a determination of time-dependent ...-momentum tensor components in a co-moving synchronous reference frame, which is shown to ... tions made. A solution is also obtained for a nonrelativistic gas with constant isentropy index. Orig. art. has: 31 formulas. "We ... Zel'dovich, Ye. M. Lifshits, I. ... and I. M. ...

...: Institut khimicheskoy fiziki Akademii nauk SSSR ...

SUBMITTED: 23May64 ENCL: 00

... CODE: GP NR REF SOV: 004 OTHER: 001

Card 2/2

KOMPANEYETS, Aleksandr Solomonovich, doktor fiz.-matem. nauk, ~~prof.; FAYNBOYM, I.B., red.~~

[Symmetry] O simmetrii. Moskva, Znanie, 1965. 44 p. (Novoe v zhizni, nauke, tekhnike. IX Seriia: Fizika, matematika, astronomiia, no.6)

[Symmetry in the microcosm] Simmetriia v mikromire. Moskva, Znanie, 1965. 44 p. (Novoe v zhizni, nauke, tekhnike. IX Seriia: Fizika, matematika, astronomiia, no.7) (MIRA 18:4)

KOMPANEYETS, A.S.; MOSHKINA, R.I.

Applicability of a radical chain scheme to the kinetics of high-temperature methane oxidation initiated by nitrogen oxides. Kin. i kat. 6 no. 6:1098-1101 N-D '65 (MIRA 19:1)

1. Institut khimicheskoy fiziki AN SSSR. Submitted November 25, 1964.